

Lawson, G.

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APPENDIX.

THE SCHOOL FERN-FLORA OF CANADA.

COMPRISING DESCRIPTIONS OF ALL FERNS KNOWN TO INHABIT THE DOMINION,
TOGETHER WITH AN ACCOUNT OF THEIR GEOGRAPHICAL RANGE OR
PREVALENCE IN THE SEVERAL PROVINCES, AND SPECIAL LOCALITIES
FOR THE RARER SPECIES.

BY PROF. GEORGE LAWSON.

FERNS: THEIR GENERAL CHARACTER; THEIR PARTS OR ORGANS; CLASSIFICATION OF THE CANADIAN FERNS.

The Ferns form a very natural and distinct group of plants. They are familiar to all observers of natural objects from the beauty of their ample foliage, which is most commonly plume-like in form, of a fresh and vivid green hue, and much divided or cut into small leaflets or lobes; these, on close observation, are seen to be marked on the surface, or lightly sculptured or embossed, with delicate veining.

The Ferns are called *Cryptogamous* (flowerless or hidden-flowered) plants, because flowers proper, consisting of petals and other showy parts, are here absent. They are also called *Acrogens* (summit growers), on account of a peculiarity in the mode of growth of their stems, which do not increase, as in hardwood trees, by annual layers of wood, or, as in the palm-stem, by descending, interlacing, fibrous bundles, but only by successive additions at the top end or apex.

The Parts or Organs of the Fern.

The Fern Plant is formed of parts or Organs that are very different, both in nature and appearance, from the parts that we see in ordinary Flowering Plants. In order to understand the descriptions of the different species, we need to know the terms that are used to denote the several parts of the plant. There are no proper *flowers* on the Fern Plant, so that we do not apply that term, or any of the terms used to describe the parts of flowers, to any part of a fern; but the fern bears a granular substance, which takes the place of flowers and seed, and words (or scientific terms) are used to express its nature and parts, just as names are given to the parts of the flower. Ferns, to the ordinary observer, seem to have leaves, and these are usually green and flat and more or less divided, like many true leaves, but they are not merely leaves; they are also the fruit or seed-bearers, and the botanist calls them *Fronde*s.

The Fern Stem or Rhizome.

As to the part that constitutes the true Stem in ferns, some explanation may be required, especially by those who have been accustomed to see *Tree Ferns* of warm and equitable climates free from winter frosts, (such tree ferns may be seen in the conservatories of public gardens). In the Tree Fern, the stem rises, erect and tree-like, into the air, clothed below with the remnants or stubs of old decayed fronds, these stubs being themselves invested more or less completely with the flexuous, hard and black root fibres, which, originating from the stem itself, are insinuated among the old stubs. From the summit of this stem or trunk of the tree fern, there is a radiating, widely-spreading expanse of delicately divided fronds, drooping gracefully towards their tips,—the whole presenting a striking object of beauty. The organ thus developed into an erect stem in tree ferns is called the *Caudex*.

Among our native Canadian ferns we have one imperfect example of this erect caudex-growth in the first fern to be described, the Ostrich Plume Fern, a species probably very ancient in origin, but which still exists in two apparently distinct varieties, one confined to Europe, the other to America. While the Ostrich Plume Fern has an erect bulb-like corm, producing from its apex a circle of magnificent, erect, plume-like fronds, thus simulating the tree fern, (the

European plant, as seen in Botanic Gardens, having apparently a more elongated and elevated corm than ours), yet this corm differs from the true aerial stem of tree ferns, not only in its partially subterranean character, slight elongation, and limited endurance, but also in sending forth radiating horizontal runners, ending in buds or young corms, which become new plants, thus giving a lateral mode of propagation or increase. We have no true tree ferns in Canada to whose stems the term caudex can be properly applied, and in describing our Ferns this part is called the *Rhizome*.

Different kinds of Rhizomes.

In our Canadian ferns the stem is usually prostrate, often underground, or at the surface and covered by moss or herbage, or hid in the crevices of rocks, the anterior or growing extremity only, with its fronds and crown of frond buds, assuming the erect position. Such stems resemble the underground creeping root-like stems of flowering plants, and are thus called *Rhizomes*. The rhizome differs very much in form and size in the different genera of Ferns:—

In many ferns the rhizome is stout, produces root fibres principally at the older or posterior end, and is abundantly covered with the persistent stalk-remnants or stubs of the decayed fronds of former years.

In the Common Polypody the rhizome is elongated, rather thick, fleshy, and creeping on rocks, trees, or other solid surfaces, without persistent stipe-stubs, the stipes or stalks finally becoming completely separated from the rhizome by a joint or articulation, as in ordinary deciduous leaves.

In a third class of ferns the rhizome is very slender, cord or wire-like, creeping underground, often much branched, not forming bud-crowns, and consequently not producing circular tufts of fronds, but sending them up singly at intervals along its course. When the fronds decay they do not leave the lower parts of the stalks behind as permanent stipe-stubs.

The rhizome is a part of great importance, often presenting characters whereby different ferns may be clearly distinguished from each other, but superficial observers are apt to neglect it, and to be contented, in collecting specimens for examination or preservation, with the mere fronds seen above ground, which, when studied alone, are in many cases puzzling, from the tendency to mimicry of form so often found in plants that are really distinct.

THE FERN FROND; ITS PARTS; THE STIPE OR STALK; THE LAMINA OR LEAFY PORTION; DIVISION AND CUTTING OF THE LAMINA; FRUIT DOTS; THE RACHIS; VEINING.

From the indications given, it will be seen that the principal Organs of our fern plants are: (1) the (mostly) horizontal *Rhizome*, with its, often wiry, tortuous, descending root-fibres, produced not only from its posterior extremity, but often also emergent along its course from the matting of more or less decayed stipe-stubs; (2) the *Frond*, or leaf, which, as in ordinary leaves, consists of two parts,—the *Stipe* or stalk (corresponding to the petiole of flowering plants), and the *Lamina* or leafy portion, which, in a few cases is simple or undivided, but in most ferns is much divided, and in various ways in the different groups.

THE LAMINA.—The *Lamina* may be more or less deeply cut or cleft from the margins towards the *Rachis* or midrib, when it is said to be *Pinnatifid*. When the clefts are complete so as to reach the rachis, and divide the lamina into separate leaflets, arranged feather-like in pairs or alternately, on either side of the rachis, the lamina is said to be *Pinnate*, and the leaflets are termed *Pinnæ*. These pinnæ may be again divided in a similar manner, into distinct divisions or leaflets along either side of a *Secondary Rachis*, and such divisions or leaflets are called *Pinnules*, the lamina thus becoming *Bipinnate*. The pinnules may themselves be partially cut into lobes so as to be pinnatifid, or even completely divided into perfect leaflets, and then the frond becomes *Tripinnate*. These differences are important in distinguishing the several species; but it is to be observed that the extent of division of parts is less perfect in young and stunted forms, and more complete in those that are mature and luxuriant,—so that in a species normally bipinnate, a young or starved frond may be only pinnate with pinnatifid divisions, while an old or luxuriant one may be bipinnate with pinnatifid divisions, or even tripinnate. Such cases occur in the Lady Fern and the Buckler Fern.

FRUIT DOTS.—In many ferns the lower surface of the frond has fruit dots, which are most abundant on the upper half of the frond, but, in certain species, there are separate fertile and infertile fronds, the fertile ones being usually narrower in their parts or altogether contracted and unleafy.

**The Rachis, and its side Branches or Rachides ; Veins ; Veinules ;
Veinlets.**

As the continuation of the *Stipe* into a divided or compound frond-lamina is called the *Rachis*, and its side branches *Secondary Rachides*, so, when the lamina is simple or undivided, the midvein (in that case also a continuation of the stipe) is called the *Costa* or midrib. The different modes in which the veins, forming the framework of the leafy portion of the frond, are disposed afford useful characters in the discrimination of species ; the branches from the costa are termed *Veins* ; the branches from these veins are called *Veinules*, and the branches of the veinules, *Veinlets*. In like manner, whatever may be the extent of division of a frond into pinnæ or lobes, the *Veins* are the first series of branches from the midrib or costa (whether of the frond when simple, or of its separate ultimate divisions, or leaflets, when compound). *Veins* are the primary branches from the costa, *Veinules* the secondary, and *Veinlets* the tertiary series. Where there is no prominent costa, the ribs arising directly from the base of the leaflet are called veins. The part of the vein on which the fruit dot or *Sorus* is seated, is called the *Receptacle*.

The parts described may all be seen, more or less distinctly, by the naked eye, but, in examining the veining of the fronds, the sorus or fruit dot, and its protecting indusium, a simple lens or magnifying glass of any kind will give great help.

THE SORUS, OR FRUIT DOT.—The sorus (plural *sori*) will be seen to consist of numerous visor-shaped, usually stalked, pouches, called *Spore-Cases*, each filled with an exceedingly fine dust ; the individual particles of this dust, called *Spores*, are too minute to be visible even to the keenest human eye, without a lens, yet it is these tiny particles that give rise (as if they were buds or seeds) to new individual plants. The remarkable processes attending the growth and development of these invisible specks into fern plants can only be followed by use of the compound microscope.

THE INDUSIUM.—In some ferns (as the common polypody and the oak fern) the sori are simply round granular dots of spore cases, without any protective covering ; in many others, the little clusters of spore cases are enveloped or sheathed at first in a delicate, colourless, scale-like membrane, or are surmounted by a small disc or shield-like covering. This protecting organ, which falls away as the spore cases mature and drop their spores, is called the *Indusium*.

THE SPECIES OF FERNS ; THEIR ARRANGEMENT OR CLASSIFICATION INTO GENERA ; THEIR GENERIC AND SPECIFIC NAMES.

GENERA AND SPECIES.—The species of ferns are classified into *Genera*, and each genus has its generic name ; it is usual to illustrate this by comparing a genus to a family of people, each *Genus* of plants being known by its generic name just as each family is known by the ancestral name. In like manner, as the full name of a person is formed by uniting the individual or given name with the ancestral family name, so the full name of the kind or species of fern is formed by writing together the generic and specific names, as *Polypodium vulgare*, in which *Polypodium* is the generic, and *vulgare* the specific name. This comparison of the names of species and genera of plants to the individual and family names of people is correct merely so far as it is an example of the mode adopted in naming things and animals and people ; it must not be supposed that the analogy or comparison can be carried further, for a person is not a species, but only one of a great many individuals, who, taken together, form the human race, the *species*. It is equally true that a family, a number of related individuals, can only be likened in a distant way to a *genus*. More correct comparisons may be made with the lower animals. The dog and jackal and wolf are all different, and easily known from each other, they are all separate species, and those who study animals—zoologists—give to each a *specific* name, just as botanists do with their plants. But the dog and jackal and wolf are in many ways alike,—in the forms of their bodies, their teeth, their food, their habit of running in packs, and so on,—and a zoologist may class them all together into one genus, and give to that genus the generic name *Canis*. So with our Ferns. All the delicate Bladder Ferns are known by the generic name *Cystopteris* ; the family of Spleenworts is known as *Asplenium* ; the Shield Ferns, with hard glistening spiny-edged fronds, and orbicular strong shield-like indusia or coverings to their fruit dots, are styled *Polystichum* ; and the species of Buckler Ferns, with duller foliage and thinner kidney-shaped indusia, are called *Lastrea*. The separate species in a genus have each a *Specific* name or term added to the generic one, just as human individuals, members of the same family, have different christian names, and, as we have seen, the two names or terms so united form the complete name of the particular

species of plant. Thus: *Cystopteris fragilis* is the name applied to all the individuals (themselves undistinguishable from each other) of this particular species of plant,—*Cystopteris* being the generic, *fragilis* the specific, term.

VARIETIES.—All the individuals of a species are not exactly alike, however, either in plants or animals. We know that in the human species the people of different parts of the earth are in some respects different from each other. Although all dogs are of one species, yet there are many kinds of dogs that are easily recognized from each other, such as terriers, hounds, and spaniels, and these are classified and named as varieties. It is exactly the same in the case of ferns and other plants. The last species mentioned, *Cystopteris fragilis*, fringes the sea-shores and islands and the rocky banks of our lakes and streams, and varies in size, and in the form and division of its fronds, in different situations; but this species also extends over a large portion of the globe, being equally at home on the Greenland and Labrador shores, in gulches on the highest snowy peaks of Colorado, on winterless islands like Madeira, in Mexico, various parts of South America, Australia, Africa and Asia. It is to be expected that this little wanderer will vary in appearance, dwarfing where it meets with lack of heat or moisture, becoming almost an evergreen where it has no severe winter to contend with, swelling out to large size and becoming of soft juicy texture where it grows in a mild saturated atmosphere. In such ways, *Varieties* are produced, and when these varieties appear to be sufficiently constant, and not the mere result of temporary surroundings, names are given to distinguish them. The name of the variety has to be added to the names of the genus and species, and thus it comes that some of the ferns have three, instead of two, names.

How the different Genera of Ferns are known.

The most precise distinctions between the different genera are found (1) in the nature and branching of the minute veins in the divisions of the fronds,—whether they form a connected net-work or are spread out, simple or forked, like a fringe; (2) in the position of the fruit dots (called *Sori*) on the frond, and whether the *Sori* are separate from the veins or connected with them at their points, or sides; (3) in the absence or presence of a special involucre or general covering for the *sori* or masses of spore cases, formed by the incurving of the frond-margin; and (4) in the

character, when present, of the delicate membrane or scale-like body called the *Indusium*, which covers and protects the *Sorus* until the spore-cases are matured.

The Table of Generic Characters, and figures of portions of fronds showing sori and venation, will assist in identifying the several *Genera*. When the genus is found, the description given of each species will enable the species to be detected.*

GENERA OF FERNS, (Canadian).

- I. TRUE FERNS.—*Fronds circinate in bud (unrolling in form of a crozier); spore-cases with an elastic ring, which at maturity straightens out and tears their delicate membrane, allowing the spores to escape.*

GENUS.

- I. **Struthiopteris.** Pinnæ of the few fertile fronds not leafy, much contracted, the small pinnules turned back, bearing sori (fig. 1, a.), with thin lacerate evanescent indusia; veinules of infertile fronds free (not netted), fig. 1, b.) (A very large fern, its erect fronds in compact circular tufts).
- II. **Onoclea.** Pinnæ of the few fertile fronds short, not leafy, much contracted, forming globose involucre (fig. 2, a); venation of infertile fronds netted, fig. 2, b.) (A large fern with ample, coarsely divided fronds).
- III. **Woodsia.** Fronds all leafy, often scaly; indusium, a very thin hemispherical membrane, which splits from the top downwards, in some cases into a mere fringe, and gradually disappears as spore-cases mature, (fig. 3, a, nat. size, b, enlarged). (Small tufted ferns).
- IV. **Dennstaedtia.** Fronds all leafy, soft and hoary; indusium cup-shaped (not valved) on end of veinlet, (fig. 4, a, nat. size, b, enlarged). (Large fern, with elongated fronds and creeping rhizome).

* Where the Fern-Flora is used, it will be found a good plan to keep, in the School, a Collection of Dried Specimens of all the Ferns of the immediate district. These specimens can be compared, in lessons, from time to time, with the descriptions given of the genera and species. The Pupils may then be directed to search, in suitable localities in the woods, for the particular species. Having collected their plants, they should be allowed to compare these fresh-gathered specimens with the dried specimens in the School Collection, and with the descriptions in the book, so as to ascertain how far they agree, or are different. The great object should be to avoid all puzzling, and lead to pleasant and intelligent enquiry into points of correspondence and difference.

GENUS.

- V. **Cystopteris.** Fronds all leafy; indusium a small, thin, pointed, scoop-shaped scale or membrane, attached at its base to a veinule, and at first hiding the spore-cases, (fig. 5, *a*, nat. size, *b*, enlarged). (Small ferns, somewhat tufted.)
- VI. **Adiantum.** Fronds all leafy, unusually thin and papery; sori borne on special involucre formed by upper portions of the margins of the leaflets of the frond folded back, the spore cases on their under side. (A rather small fern with aggregated but not tufted fronds.)
- VII. **Cheilanthes.** Fronds all somewhat leafy, woolly or chaffy; involucre formed of reflexed portions of the frond-margin, spore cases on the frond itself. (Small ferns.)
- VIII. **Pteris.** Fronds all leafy, hard, much-divided; involucre parallel with and under reflexed margin of pinule, spore cases forming a continuous marginal line, (fig. 6.) (A very tall fern, fronds rising singly from a running rhizome.)
- IX. **Pellaea.** Fronds all leafy, hard, rather dull-green, not much divided, fertile ones with narrower divisions; the reflected margins of the pinnæ forming indusia; spore cases crowded in a continuous line. (Small ferns, not tufted.)
- X. **Cryptogramme.** Infertile fronds leafy, bright green; the fertile ones narrower, contracted, and duller in colour; involucre broad, appearing marginal; spore cases crowded, continuous when the involucre opens. (A small tufted fern.)
- XI. **Lomaria.** Infertile fronds leafy (lying flat on the ground in our species), fertile ones contracted (erect); indusium parallel to midrib and between it and margin of pinna; spore cases in continuous lines.
- XII. **Woodwardia.** Fronds all leafy, the pinnæ of fertile ones narrowed; indusia with spore cases in clusters forming a chain on each side of costa or midrib of pinna. (Medium sized fern, with strong creeping rhizome, fronds not tufted.)
- XIII. **Asplenium.** Fronds all leafy; sorus and indusium linear or oblong, straight, attached longitudinally to vein or veinule, and opening towards midrib, (fig. 15). (Mostly small ferns with fronds simply pinnate.)
- XIV. **Athyrium.** Fronds all leafy; sorus and indusium as in preceding genus, but more or less curved or horse-shoe form (in some cases evanescent, or not developed), attached to veinules, but not parallel with them, opening towards the costa, (fig. 8). (Large ferns, with delicately divided fronds.)
- XV. **Scolopendrium.** Fronds all leafy (strap-shaped); sori long, straight, in pairs, parallel to veinules, and covered at first by long straight indusia opening along the the centre (fig. 7); (veins free). (Medium sized fern with undivided frond, except in abnormal varieties).

GENUS.

XVI. **Camptosorus.** Fronds all leafy (irregularly strap-shaped, with long slender points that take root and form new plants); sori oblong or linear, scattered over the under surface of the frond between midrib and margin; indusium slight, (fig. 10). (A small fern with undivided fronds, often rooting at tips).

XVII. **Polystichum.** Fronds all leafy, of firm texture, bright green, and upper surface more or less glossy, the lobes with minute marginal bristle-like spines; indusium firm, shield-like, attached by its centre, the spore cases showing from beneath its margin all round, (fig. 11, *a*, nat. size, *b*, enlarged). (Rather large evergreen glossy ferns).

XVIII. **Lastrea.** Fronds all leafy, somewhat leathery, vivid or dark green, rather dull than glossy; indusium kidney-shaped, attached at a point between its two lobes, the spore cases showing from beneath its margin except at point of attachment, (fig. 9). (Mostly large, much-divided ferns, imperfectly evergreen).

XIX. **Polypodium.** Fronds all leafy, somewhat leathery; no involucre nor indusium; sori round, arranged on each side of midrib (fig. 12); stipes articulated with the creeping rhizome. (Small creeping ferns, with stalked pinnatifid fronds).

XX. **Phegopteris.** Fronds all leafy, (softly herbaceous or papery); no involucre nor indusium; sori round; stipes continuous with rhizome, (not articulated), (fig. 14.) (Rather small ferns, with creeping rhizomes and long stipes).

XXI. **Gymnogramme.** Fronds all leafy, (the lower surface in our species covered with a yellow or white powder); no involucre nor indusium; sori elongated. (Small ferns with rather long-stiped hard fronds).

XXII. **Osmunda.** Infertile fronds leafy; fertile fronds, or fertile portions, contracted; no involucre nor indusium; spore cases reticulated two-valved with a *horizontal* ring. (Very large ferns with very stout, branched rhizomes, covered with stipe-stubs).

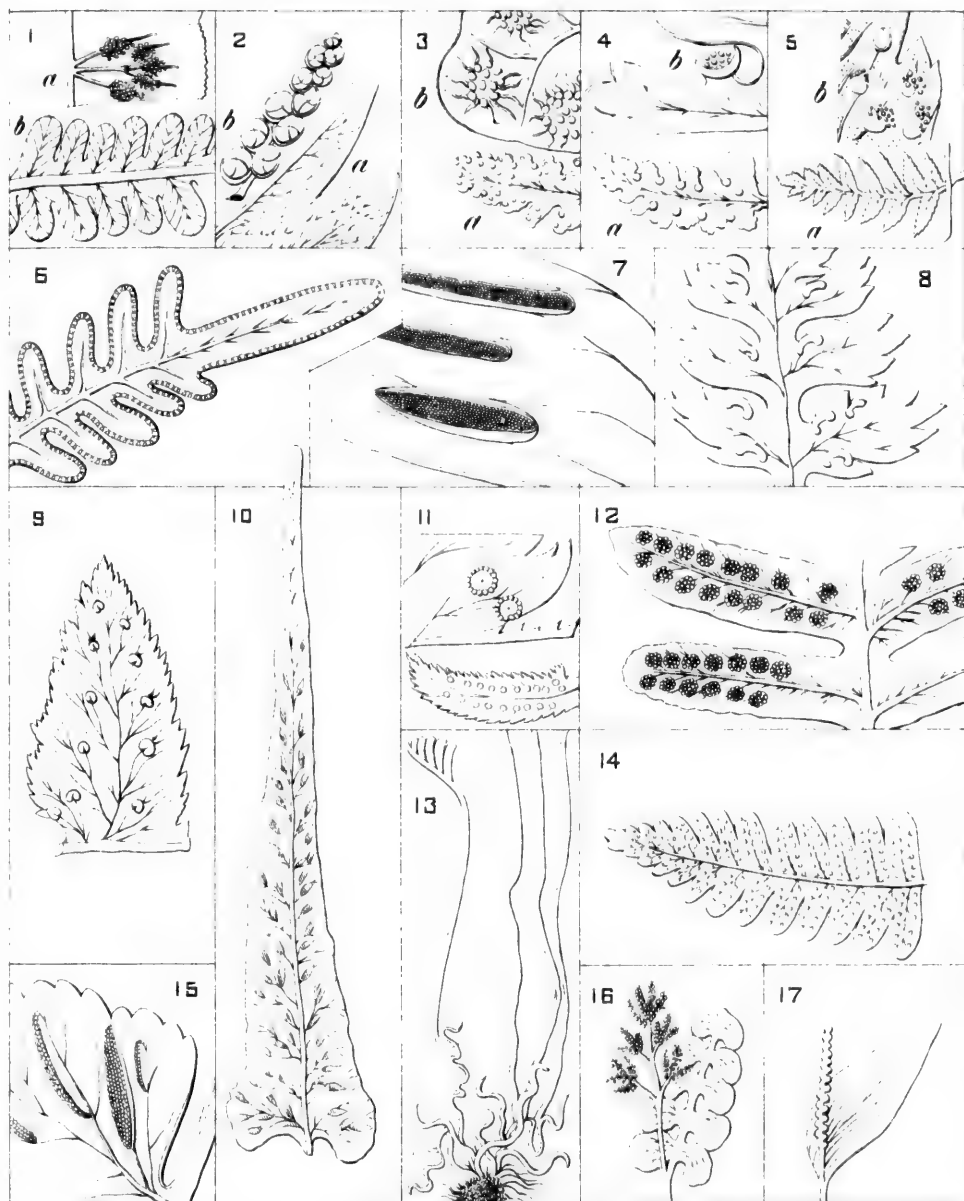
XXIII. **Schizaea.** Infertile fronds slender and curled, less than an inch long (like minute tufts of grass); fertile ones longer and straight, expanded at top into a few close-set narrow-pinnæ (brush-like), bearing spore cases, with ring on top, (fig. 13). (Minute, grass-like).

2. MOONWORTS AND ADDER'S TONGUE.—*Fronds not circinate but folded in bud; spore-cases splitting into two valves, without a ring or elastic rachis.*

XXIV. **Botrychium.** Frond erect leafy, with terminal branched spikes, bearing non-reticulated spore-cases in double rows on the face of the branches, (fig. 16). (Small ferns, with fronds in two parts,—a lower, leafy, divided, infertile portion or lamina, and a terminal branched fertile spike).

XXV. **Ophioglossum.** Frond erect, with a single sheathing leaf, and a simple stalk, bearing two rows of non-reticulated splitting spore-cases on the edges of its upper part, (fig. 17). (A small fern with a simple lamina subtending a simple fertile spike).

CANADIAN FERNS. ILLUSTRATIONS OF GENERA



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1. STRUTHOPTERIS

5. CYSTOPTERIS

9. LASTREA

13. SCHIZAEA

2. ONOCLEA

6. PTERIS

10. CAMPTOSORUS

14. PHEGOPTERIS

3. WOODSIA

7. SCOLOPENDRIUM

11. POLYSTICHUM

15. ASPLENIUM

4. DENNSTAEDTIA

8. ATHYRIUM

12. POLYPODIUM

16. BOTRYCHIUM

17. OPHIOGLOSSUM

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DESCRIPTIONS OF SPECIES OF CANADIAN FERNS.

GENUS I.—*Struthiopteris*, WILLDENOW. *Ostrich Fern*.

S. GERMANICA var. *PENNSYLVANICA*, Lawson. *American Ostrich Fern*.—Rhizome erect, with lateral offshoots or runners, forming new rhizomes at their points, whereby the plant is increased. Stipe very short. Fronds tall (several feet long) in tufts composed of an outer circle of leafy green infertile fronds, with a few shorter, contracted, hard, brown, fertile ones in the centre; infertile fronds pinnate, pinnae pinnatifid, the lobes entire, rounded-obtuse, veinules parallel, distinct, running from the mid-vein to margin of lobe; fertile fronds contracted, the pinnules turned back over the sori; indusium slight and evanescent. (In the European form, the lobes of the infertile pinnae are acute or acutish.)

In deep rich soils. *Nova Scotia* and *New Brunswick*, not very common. *Quebec* and *Ontario*, abundant in many places. Does not extend northward, nor westward to the Rocky Mountains.

GENUS II.—*Oncoclea*, LINNÆUS. *Sensitive, or Rattle Snake, Fern*.

O. SENSIBILIS, Linnaeus. *Common Sensitive Fern*. *Rattle Snake Fern*.—Rhizome elongate creeping; fronds arising from it separately, not in circular tufts; lamina broad, leafy, somewhat triangular, deeply pinnatifid into oblong lobes; veins of the lobes connected together, net-like; fertile fronds erect, like a branched spike, doubly pinnate, with small, contracted, rolled-up pinnules, not at all leafy; indusium a thin membrane.

Common in wet ground throughout the *Maritime Provinces*, *Quebec*, and *Ontario*, not extending west to the Prairies, nor found anywhere on the Pacific side of the Rocky Mountains, although in North China, Amur and Manchuria.

GENUS III.—*Woodsia*, R. BROWN. *Wood's Fern*.

1. *W. ILVENSIS*, R. Br. *Common Oblong, or Rusty, Woodsia*.—Rhizome stout, invested in a bulky mass of ruddy-brown stipe-stubs; stipes articulated above the base; lamina lanceolate, bipinnate or nearly so; pinnae close together, pinnules oblong, obtuse; rachis and whole lower surface of the frond clothed with chaffy scales, which are colourless at first but become rusty at maturity; sori distinct, but close together, around and near the margins of the pinnules.

Nova Scotia:—On rocks overhanging Lake Thomas, abundant; North Mountain; South Mountain of Whycocomagh; Gold River, near Chester; Truro. *New Brunswick*:—Woodstock; Restigouche; Upsalquitch; Keswick; Nashwaaksis; St. Stephen; Green Head; St. John. *Quebec*:—Not rare. *Ontario*:—Common on outcrops of Laurentian

rocks, as at Kingston Mills. Also Lake Superior; Hudson Bay; Arctic Coast; Rocky Mountains. The genus was named to commemorate Joseph Woods, an English botanist.

2. *W. HYPERBOREA*, R. Brown. *Northern, or Alpine, Woodsia*.—Rhizome small, stout, compact; frond 1 to 2 or 3 inches long; stipe short, articulated above the base; lamina broadly linear or oblong, pinnate, more or less hairy, without distinct scales; pinnæ ovate, somewhat triangular, obtuse, pinnatifidly divided into roundish lobes.

New Brunswick:—Aroostook Falls. *Quebec*:—Cape Rosier, Gaspé; Mount Albert Falls; Rivière du Loup; Temiscouata. *Ontario*:—Lake Nipigon. Also Lake Winnipeg; Hudson Strait; Arctic Coast.

3. *W. GLABELLA*, R. Brown. *Smooth Woodsia*.—Frond 2 to 4 inches or more in length; stipe more or less elongated, imperfectly articulated above the base, and with a few scales on the lower part only; lamina thin, bright-green and glabrous on both surfaces, simply pinnate; pinnæ short, rounded or rhombic, cut into rounded or wedged lobes.

Quebec:—Jupiter River and Ellis Bay, Anticosti; Gaspé Coast; Ste. Anne des Monts River; Rivière du Loup. *New Brunswick*:—Restigouche Tunnel; Grand Falls. *Ontario*:—Kakabeka Falls; Red Rock; Nipigon River. *N. W. Territory*:—Great Bear Lake; Bow River Pass. Arctic Coast, from Mackenzie River to Baffin Bay.

4. *W. SCOPULINA*, D. C. Eaton. *Rocky Mountain Woodsia*.—Frond 3 or 4, to 6 or 8, inches in length, pubescent and glandular, not scaly; stipe not articulated; lamina oblong-ovate, crenulate; indusium split to the base into slender segments.

British Columbia and Rocky Mountains:—Kicking Horse Pass, Rocky Mountains; Fraser and Thompson Rivers, also Lytton and Kootanie Valley, B. C.; Mt. Finlayson, Vancouver Island.

5. *W. OREGANA*, D. C. Eaton. *Oregon Woodsia*.—Fronds rarely six inches in length, smooth, (not pubescent, nor glandular); stipe not articulated; lamina oblong-ovate, pinnate, the pinnæ pinnatifid; indusium very imperfect, of slender hair-like segments.

British Columbia:—Kamloops; Fraser and Thompson Rivers; Black Water River; Fort St. James. *Rocky Mountains*:—Peace River Pass. *Ontario*:—Lake Nipigon. *N. W. Territory*:—Lake Athabasca.

6. *W. OBTUSA*, Torrey. *Torrey's Woodsia*.—Frond nearly a foot long, glandulose, not scaly; stipe not articulated, with few scattered, pale, chaffy scales; lamina linear-lanceolate, almost bipinnate, the pinnules slightly decurrent, oblong, obtuse, crenate, or somewhat pinnatifid; in a large, enveloping the sorus, torn into a few lobes. (In general aspect this species resembles *Cystopteris fragilis* more than any other *Woodsia*.)

Port Simpson, *British Columbia*.

GENUS IV.—*Dennstaedtia*, BERNHARDI. *Dennstedt's Fern*, or *Hay Fern*.

D. PUNCTILOBULA, Moore. *Gossamer*, or *Hay Fern*.—Frond two feet or more in length, with stout, erect, wiry stipe and rachis, and soft, thin, pale-green, finely-divided downy lamina, exhaling the odour of sweet hay when dry. Rhizome slender and branched, extensively creeping in soil or among stones; lamina elongate-oblong, broad at base, gradually attenuated in the upper half, bipinnate, downy and glandular; the segments rounded; indusium an open, pale-coloured nest-like cup, containing the spore cases.

Nova Scotia, *Quebec*, and *New Brunswick*:—Stony pastures and waysides, common. *Ontario*:—Not common, and decreasing westward; Pittsburg, near Kingston; Prescott; Ramsay, &c. The genus was named in 1803 to commemorate August Wilhelm Dennstedt, a German botanist, author of the *Flora of Weimar*.

GENUS V.—*Cystopteris*, BERNHARDI. *Bladder Fern*.

1. *C. FRAGILIS*, Bernhardt. *Brittle Bladder Fern*.—Fronds from a very few inches to a foot in length, usually bright green; rhizome compact; stipe dark purple at the base, seldom much elongated, brittle, and easily broken if specimens are not handled carefully; lamina broadly lanceolate in outline (the fertile ones narrower), glabrous, bipinnate; pinnae and pinnules ovate-lanceolate or oblong; the latter obtuse, incisely toothed, thin and veiny; sori large.

Var. *DENTATA*, Hooker, is a dwarfed form, scarcely bipinnate.

Var. *MACKAYII*, Lawson, has narrowly lanceolate, dark or dull green pinnae, far apart, the pinnules wedge-shaped at base, and rounded at apex.

Widely distributed all over Canada, but only on shady, rocky banks or hillsides, and chiefly where the air is kept moist by neighbouring lakes, rivers, or the sea. Var. *Mackayii* is a common form in *Nova Scotia*. The name of the genus is derived from the texture and form of the indusium, which is like a minute inflated bag or bladder.

2. *C. BULBIFERA*, Bernhardt. *Bulb-bearing Bladder Fern*. *Berry-bearing Fern*, of the old botanists.—Fronds very variable in size, from 5 or 6 inches to 12 or 18 inches in length, thin, bright green; rhizome compact, stipe reddish, much shorter than the lamina, lanceolate or linear-lanceolate, bipinnate, often bulb-bearing towards the apex on the under surface; pinnae oblong-lanceolate, narrowed at the tips; pinnules oblong, obtuse, incisely toothed; sori small, usually not very numerous; indusium short. This species produces fronds of two forms,—the one being broad at base and comparatively short, with horizontal pinnae, while the other kind is narrow and drawn out to a great length (six or seven times longer than broad) and with less horizontal pinnae.

Nova Scotia, *New Brunswick*, *Quebec*, *Ontario*:—In moist woods and shady, rocky

places; abundant in Ontario, extending to Manitoba; common also in Quebec. Local in New Brunswick and Nova Scotia. Grand Falls; Restigouche; St. John River; Hartley's Falls; Newport.

3. *C. MONTANA*, Bernhardt. *Mountain Bladder Fern*.—Fronds nearly a foot in length, erect, arising at intervals from the slender horizontal creeping rhizome; stipe much longer than the lamina, with scattered scales; lamina triangular, or pentagonal, in outline, tripinnate, thin and delicate; pinnules oblong-obtuse, slightly toothed.

Quebec, Rocky Mountains, Labrador:—On the mountains, usually at high elevations, but rare on this continent, and still more so in northern Europe, the only other region where it grows. Rocky Mountains, by streams; in a cedar swamp near silver mine north of Current River, Lake Superior; on northern face of Mount Albert, Gaspé; Labrador.

GENUS VI.—*Adiantum*, LINNÆUS. *Maidenhair Fern*.

A. PEDATUM, Linn. *Stalked Fan Fern, or American Maidenhair*.—Rhizome wiry, much branched, creeping near the surface; stipe dark chestnut coloured or black, shining, erect, forked at top, the forks curved downwards and branched on their upper sides, the branches bearing oblique triangular-oblong pinnules, the whole frond fan-like. Fronds wither in autumn. This is one of the most highly prized of our native ferns, whether for cultivation or in herbarium specimens.

Var. RANGIFERINUM, Burgess.—Pinnules longer-stalked, deeply cleft on the upper side into narrow sharply-toothed lobes, the divisions resembling the branching of the horns of the reindeer.

Ontario:—Not rare in Ontario, usually growing in the woods, in spots where there is an accumulation of vegetable mould,—as about Kingston; Newboro; Farmersville; Toronto; Belleville; Wolfe Island; Ramsay; Hamilton; London. *Quebec*:—Quebec City and westward; St. Joachim and Isle St. Paul; River Rouge; at Mt. Albert, Gaspé; West Hawkesbury; Granville. *New Brunswick*:—Upper Restigouche; Upper St. John; near Woodstock; Keswick Ridge; Andover; Moose Mountain. *Nova Scotia*:—Newport, near plaster pits; Archibald's mill, Upper Musquodoboit. *British Columbia*:—Queen Charlotte Islands and Gold Stream, Mt. Finlayson, where the variety, *rangiferinum*, was found.

GENUS VII.—*Cheilanthes*, SWARTZ. *Lip Fern*.

1. *CH. LANUGINOSA*, Nuttall. *Woolly Lip Fern*.—Rhizome short, knotted; stipe three or four inches long, slender, wiry, with woolly hairs that are lost as the frond matures; lamina about as long as the stipe, oblong-lanceolate, tripinnate or tripinnatifid, the ultimate segments minute, upper surface hairy, lower matted with wool.

North-West Territory, &c.:—Rocky Mountains; Bow River. *British Columbia*.—New Caledonia; North Thompson River; Black Canyon.

2. *CH. GRACILLIMA*, D. C. Eaton. *Slender Lip Fern, or Lace Fern*.—Rhizome creeping, entangled, scaly; stipe 2—6 inches, dark, with sparing deciduous scales; lamina linear-lanceolate, bipinnate, the pinnæ pinnatifid, pinnules oval-oblong, woolly beneath.

British Columbia, rare. Near the Pend d'Oreille River. Vancouver Island.

GENUS VIII.—*Pteris*, LINNÆUS. *Brake, or Bracken*.

PT. AQUILINA, Linnæus. *Common Brake, Eagle Fern*.—Rhizome elongate creeping; stipe stout, erect, 1 to 4 feet high, divided into three branched laminæ; branches bipinnate, the pinnæ pinnatifid, with oblong-lanceolate lateral pinnules and usually elongated terminal ones, lobes of the frond firm, dull green, glabrous. Varies with the pinnules pinnatifid or entire.

Var. *LANUGINOSA*; divisions of the frond bipinnate, thin and membranous, not hard, pinnules pinnatifidly toothed, the teeth rounded, under surface with long, scattered wool-like hairs.

In woods and on hill-sides, common everywhere, except in the prairie countries and in the colder northern regions. Var. *lanuginosa*, (which is a prevalent form in tropical countries) grows in Gaspé, *Quebec*, (Dr. John Bell, 1862), also in *British Columbia*, (Prof. Macoun).

GENUS IX.—*Pellaea*, LINK. *Cliff Brake*.

1. *P. STELLERI*, Beddome. *Steller's Cliff Brake*.—Rhizome slender, creeping, sending up separate, not tufted, fronds, 3 to 9 inches high, whole plant glabrous; lamina pale green, thin and papery, a very few inches long, bipinnate or tripinnate, some of the smaller barren fronds scarcely more than pinnate; pinnæ 5 or 6 pairs, lobes of the barren frond rounded, oval, veiny; of the fertile frond much narrower, linear-lanceolate, firmer; sori at the tips of the forked veins, along the margins. The surface of the soil or rocks around the plants is often covered with a green growth of pro-thallia (sporelings), flat thallus growths arising from spores and from which the first young fronds of the new plants may be seen to sprout.

On shelving cliffs and crevices of rocks, rather rare. *New Brunswick*:—Morris Falls, Restigouche; Grand Falls, Woodstock. *Quebec*:—Lake of Three Mountains; Cacouna; Rivière du Loup; Gaspé; Ottawa. *Ontario*:—Belleville; Lakefield; Niagara River. Also Peace River Pass, N. W. T., and Labrador.

2. *P. ATROPURPUREA*, Link. *Clayton's Cliff Brake*.—Rhizome short knot-like; stipe and rachis almost black, shining, 6 to 12 inches high; lamina coriaceous, pinnate, divisions opposite, linear-oblong or somewhat oval.

Ontario:—Hamilton; Elora; Niagara Whirlpool; Owen Sound. *British Columbia*:—Black Canyon and Cache Creek. *Rocky Mountains*, rare. First found by John Clayton, about 1736, on the shore of the river Rappahannock.

3. *P. DENSA*, Hooker. *The Breckenridge, or Oregon, Cliff Brake*.—Rhizome densely tufted; stipes about 6 inches long, slender, wiry; lamina triangular or pentagonal in outline, tripinnate, the ultimate segments linear, pointed, closely set; (infertile fronds very rare, their segments wider, and serrated.)

Rare. *Quebec Province*.—On exposed rocks, Mount Albert, Gaspé. *British Columbia*.—Vancouver, and Cascade Mountains.

GENUS X.—*Cryptogramme*, R. BROWN. *Rock Brake, or Parsley Fern*.

C. CRISPA var. *ACROSTICHOIDES*, Lawson. *The North-West Parsley Fern, or American Rock Brake*.—Rhizome stout, densely tufted, chaffy; stipes pale or yellowish brown, very short in the infertile fronds, lamina much dissected into small toothed or incised lobes; fertile fronds with longer stipes, and fewer, narrow, thickened segments.

In crevices of bare rocks and among stones, usually at high elevations, not common. North-West Territories, Rocky Mountains, Cascades, and on the Arctic Coast; also Lake Superior.

GENUS XI.—*Lomaria*, DESVAUX. *Hard Fern*.

L. SPICANT, Desv. *Northern Hard Fern*.—Rhizome rather stout, scaly, with thick branched root-fibres; stipes of infertile fronds short, lamina prostrate, linear-lanceolate, pinnatifid (comb-like), the lobes linear-oblong, flat, slightly curved toward the points, margin entire; fertile fronds erect, longer than the others, forming a central tuft, pinnatifid, below pinnate, the pinnæ or lobes contracted, linear acute, with reflexed margins, the lower ones very small.

British Columbia.—Victoria, V. I., and on the mainland, but limited to the Pacific Coast. Common in Northern Europe.

GENUS XII.—*Woodwardia*, SMITH. *Woodward's Fern*.

W. VIRGINICA, Smith. *Virginian, or Northern, Woodwardia*.—Rhizome stout, much elongated, creeping, chaffy; fronds aggregated, but not tufted; stipe stout and long; lamina lanceolate, pinnate; the pinnæ lanceolate, pinnatifid, forming an acute angle with the rachis, sori linear-oblong, arranged in line on either side of the midribs of pinnæ and pinnules.

Ontario.—Millgrove Marsh, Hamilton; Heck's Mills near Prescott; Augusta; Pelham; Belleville; Lake Island, Muskoka; Gull Lake, Addington; Mer Bleu, near Ottawa. *Quebec*.—Near Gaspé Basin. *Nova Scotia*.—Between Caledonia and Liverpool; H. Lawson's, North-West Arm, Halifax; between Liverpool and Jordan River, Shelburne.

GENUS XIII.—*Asplenium*, LINN. *Spleenwort*.

1. *A. TRICHOMANES*, Linn. *Common Maidenhair Spleenwort*.—Fronds tufted, from a compact rhizome; stipe and rachis blackish brown, margined; lamina narrow, linear, pinnate; pinnæ roundish-oblong or oval, oblique, almost sessile, crenate; sori distant from the midrib. A small fern (3 to 8 inches), with dark stiff stipes and small roundish pinnæ.

Ontario:—Not rare in central parts. Kingston; Brockville; Belleville; Gananoque River; Rideau Canal; Thousand Islands; Hamilton. *Quebec*:—Ottawa; Cap Tourmente. *Nova Scotia*:—Canso; North Mountain.

2. *A. VIRIDE*, Hudson. *Green-stalked Spleenwort*.—Rhizome slightly tufted, creeping, with few dark brown scales; fronds a few inches only in length, linear, pinnate; stipes less than a third the length of lamina, rounded on back, flat or channeled in front, dark brown merely at base, green upwards, and rachis green like the pinnæ; pinnæ roundish, oblong or oval, more or less cuneate at base, slightly stalked, crenate or slightly lobed, delicate, bright pale green; sori borne on the anterior (forward) side of the side vein, and near to the midrib of the pinna. In outline of frond and general aspect resembles the preceding, but easily known by the bright green colour of stipe and rachis.

New Brunswick, Quebec, and North-West:—Gaspé; Tadousac; Rivière du Loup; St. John, (G. U. Hay); North-West America, and Rocky Mountains.

3. *A. PLATYNEURON*, Oakes. *Ebony Spleenwort*.—Frond erect, 6 to 12 inches, rachis blackish-brown, shining; lamina lance-linear, pinnate; pinnæ numerous, lanceolate (the lower oblong) sessile, auricled at base, and finely serrate.

Ontario:—Brockville; Belleville.

4. *A. ANGUSTIFOLIUM*, Michaux. *Narrow-leaved Spleenwort*.—Frond large (1 to 3 feet high), annual, lamina lanceolate, pinnate, pinnæ long, linear lanceolate, acute, fertile fronds more contracted than the barren ones.

Ontario:—Malden; Oil Wells, Enniskillen.

5. *A. MARINUM*, Linn. *Sea-shore Spleenwort*.—Tufted, from a compact rhizome; stipe chestnut-brown, polished; rachis brown below, green and winged above, broad and leafy, bright green and shining, oblong lanceolate, tapering to a point, pinnate below, pinnæ ovate oblong or linear, oblique, shortly stalked, rarely pinnatifid, the upper pinnæ confluent, so that the upper part of the frond is simply pinnatifid, and towards the tip merely incised; sori large, linear, oblique.

Very rare, and special locality not known. This, in other countries, is a coast plant, growing in the crevices of bare rocks, and especially in rocky caves, by the sea-shore. There are Nova Scotian specimens in the Kew Herbarium, referred to in Hooker & Baker's *Synopsis Filicum*, second edition, 1883, but this fern has not recently been found in Canada. It grows around the shores of Western Europe, and extends from Orkney, the British Isles, Canaries and Azores, to St. Vincent and South Brazil.

GENUS XIV.—*Athyrium*, Roth. *Lady Fern*.

1. *ATH. FILIX-FEMINA*, Roth. *Common Lady Fern*.—Rhizome large and stout; fronds ample (1 to 3 feet long) in large tufts, and of a delicate bright green hue; stipe long, (very erect in strong plants); lamina broadly oblong, lanceolate, bipinnate, pinnæ also lanceolate; pinnules ovate-lanceolate oblong, incisely toothed; indusium, a very delicate fimbriated membrane. Variable in size and in form of frond; stunted forms with flattened concave stipes, and laminae more or less drooping or prostrate, form the variety *MOLLE*. Fronds wither in autumn.

Common in shady situations wherever ferns grow.

2. *ATH. ALPESTRE*, Nylander. *Alpine Lady Fern*.—Rhizome short and stout, scaly toward the apex; stipes comparatively short, slightly scaly; lamina broadly oblong-lanceolate or narrowly lanceolate, erect, dark green, (rather firmer in texture than in preceding species), bipinnate; pinnæ linear-lanceolate, tapering to a point; pinnules ovate-oblong or ovate-lanceolate (somewhat falcate), deeply pinnatifid or almost pinnate. Sori roundish, usually without indusia. Fronds wither in autumn.

British Columbia:—Cascade and Selkirk Mountains.

3. *ATH. THELYPTEROIDES*, Desvaux. *Angle-fruited Lady Fern*.—Rhizome stout; fronds 1—3 feet long, erect; stipe long, slightly scaly; lamina oblong-ovate or broadly lanceolate, acuminate, pinnate; pinnæ lanceolate, acuminate, from a broad sessile base, and deeply pinnatifid, the lobes oblong, minutely toothed, sori elongate-oblong, quite straight, with entire indusia.

Quebec:—At St. Joachim; Belœil Mountain. *Ontario*:—Ramsay; Belleville; London; Prescott. *Nova Scotia*, not rare, as Halifax and Cumberland Counties. *New Brunswick*:—Fredericton; Bass River; Salmon River.

GENUS XV.—*Scolopendrium*, Smith. *Hart's Tongue Fern*.

S. VULGARE, Smith. *Common Hart's Tongue Fern*.—Rhizome short, tufted, scaly; stipe one-third the length of frond, scaly, and the midrib or costa slightly scaly beneath; lamina strap-shaped with a cordate base, usually undivided, margin entire, from 6 inches to 2 feet in length; sori linear oblique, in pairs, the two contiguous ones becoming confluent, (that is uniting together so as to seem to form one).

Ontario:—Owen Sound, Georgian Bay, Lake Huron. *New Brunswick*:—Woodstock.

GENUS XVI.—*Camptosorus*, Link. *Walking Leaf Fern*.

C. RHIZOPHYLLUS, Link. *Travelling Fern*. *Walking Leaf*.—Fronds evergreen, a few inches long, variable in size and shape, the fertile ones more elongated; lamina lanceolate, broad and hastate (somewhat arrow-shaped), wide and cordate at base, attenuated towards the tip, which strikes root and gives rise to a new plant.

Ontario:—High Falls, Portland Township, 1862; Oxford; Hamilton; Ancaster; Lake Medad; Wolfe Island; Owen Sound; near Ottawa. *Quebec*:—Montreal Mountain.

GENUS XVII.—*Polystichum*, SCHOTT. *Shield Fern*.

1. *P. ACROSTICHOIDES*, Schott. *Christmas Fern*.—Rhizome stout; fronds pale green, somewhat polished, coriaceous; stipe profusely chaffy, with pale scales; lamina long and narrow, linear-lanceolate, simply pinnate; pinnae long and narrow, linear-lanceolate, shortly stalked, with a projecting auricle at the base on the upper (anterior) side, more or less distinctly serrate, with hair-tipped teeth; fertile (upper) pinnae slightly contracted, covered beneath by the large crowded or confluent sori. Fronds evergreen.

Ontario, New Brunswick, Quebec, Nova Scotia:—Common in the woods in Nova Scotia, southern New Brunswick, Quebec, and Ontario.

2. *P. MUNITUM*, Presl. *British Columbian Shield Fern*.—Rhizome stout, with old stipe stubs, (ending in a crown), frond buds scaly; stipes, covered with brown scales, one-third length of lamina; lamina lanceolate, 1 to 2 or 3 feet long by 3 to 5 inches wide. Fronds evergreen.

British Columbia:—Vancouver Island, not rare there, but confined entirely to the Pacific Coast, being unknown in the other Provinces.

3. *P. LONCHITIS*, Roth. *Alpine Shield Fern. Holly Fern*.—Rhizome very stout, covered with wiry root-fibres; stipe very short with large pale scales which extend, but of smaller size, to the rachis; fronds 6—18 inches or more, rigid, bright green, polished, coriaceous, linear-lanceolate, simply pinnate, pinnae numerous, distant below in younger fronds, with hair-like scales beneath, above crowded, often imbricated, lanceolate, falcate, an inch long, acute, prominently auricled at the base on the upper (anterior) side, the margin with spiny serratures and intervening teeth. Sori on the upper portion of the frond, indusium rounded, peltate, denticulate. Fronds evergreen.

Nova Scotia:—Aspey Bay, Cape Breton. *Ontario*:—Below the whirlpool, Bruce Peninsula, Owen Sound. Also Rocky Mountains and Cascades.

4. *P. BRAUNII*, Lawson. *Dr. Braun's Shield Fern*.—Rhizome stout; fronds in circular tufts with a large central crown of frond buds; frond about two feet high; stipe exceedingly short, scaly, rachis scaly to the apex, with intermixed large and small pale ferruginous scales; lamina soft-herbaceous, lanceolate, shortly acuminate, much narrowed below, bipinnate; pinnules stalked, serrate, the small teeth tipped by soft bristles. This species is related to the English *P. angulare*, but is very different from the northern European species, *P. aculeatum*, to which, however, forms from the Pacific coast have recently been referred.

Nova Scotia:—Mabou; Bras d'or Lake; Canso; Blomidon. *New Brunswick*:—Fredericton; Andover. *Quebec*:—Gaspé and Silver Mountain; near Quebec City; Temiscouata; River Rouge. *British Columbia*:—Vancouver.

GENUS XVIII.—*Lastrea*, PRESL. *Buckler Fern*.

1. *GOLDIEANA*, Presl. *Mr. Goldie's Buckler Fern*.—Rhizome stout; fronds very large (3 or 4 feet or more in length), dark green, with ample pinnae; stipe a foot in length, with pale shaggy scales above, and large dark-centred ones below; pinnae 6 or 8 inches long, linear-lanceolate; pinnules (11 to 20 pairs) linear-oblong, approximate, uniformly curved forwards, scythe-shaped, sometimes with an extra lobe at base; sori near the midrib.

Quebec Province:—Montreal. *Ontario*:—Farmersville; Belleville; Brighton; Owen Sound; Brockville; London. Found also in the United States, south to Kentucky, but rare.

2. *L. SPINULOSA*, Presl. *Common Wood Fern*.—Rhizome stout, with dark-brown crowded, scaly, stalk-bases, the scales pale rusty-brown. Fronds two feet or more in length, erect. Stipes tufted, nearly a foot long, dark-brown at base, elsewhere green, scaly, the pale rusty brown scales larger, darker and more numerous below, the rachis scarcely scaly; lamina 15 to 18 inches or more long, by 6 to 8 or more broad, bright green, herbaceous, varying in form from oblong-lanceolate, to ovate-triangular, wide below, narrowed towards the tip, bipinnate (or tripinnate in large luxuriant examples),—the main pinnae stalked, linear lanceolate, except the lowest, which are much broader at the base, and triangular or deltoid in outline; pinnules oblong or ovate-lanceolate, acute, the largest an inch long by half an inch broad, pinnatifidly cut, or incised, into small, aristately toothed lobes, (that is each lobe ends in a fine bristle point); posterior basal pinnules of the lower pinnae much larger than the anterior ones. Sori small, arising from the side veinlets, and thus appearing between the midrib and margin of the pinnules; indusium smooth or occasionally glandular (this is best seen when the frond is newly developed). In autumn the erect stipes begin to weaken and decay at a point within an inch or two of the base, allowing the fronds to fall upon the ground. Still undetached completely from the rhizome, they lie under the snow over winter and are finally withered up by the drought of the following summer, forming a matting around the growing plant; thus the species is usually described as imperfectly evergreen. There are many variations of this species, in every country in which it occurs, that can with difficulty be distinguished from each other. The American form, which mostly prevails in Canada (our common wood fern), is known as *var. INTERMEDIA*.

Var. DILATATA has a stouter rhizome, shorter stipes, broader lamina, which is ovate, sub-triangular or oblong-lanceolate; the basal scales are larger, more abundant, and extend further up the stipe, and some of the larger scales have a very dark stripe or blotch in the centre; indusium usually (but not always) fringed with stalked glands.

Common in woods and shady places. *Ontario*:—Abundant in the woods about Kingston, as Collins's Bay, &c.; Smith's Fall's; Odessa; Falls of Niagara; Hinchinbrook; Gananoque Lakes; Farmersville; Hardwood Creek; Delta; Upper Rideau

Lake; Newboro-on-the-Rideau; Longpoint; Ramsay; Prescott; Belleville. General throughout Ontario; it is the common wood fern. *Quebec, New Brunswick, Nova Scotia*:—Common in the woods, especially in sea-shore districts. Around the wooded shores of Nova Scotia, as at Blomidon, Canso, Whycocomagh, Parrsborough, &c., this fern attains a great size, the fronds rising to a height of three or four feet. *Newfoundland*:—Probably common, although only noticed in a few localities; Langlade; Miquelon. The variety *dilatata* is found at the Joggins, near the mouth of the Bay of Fundy; also in Newfoundland.

3. *L. CRISTATA*, Presl. *Crested Buckler Fern*.—Rhizome short, stoutish, branched, with scaly adherent stipe stubs. Fronds erect rigid, in tufts, from 1 to 3 feet high (the infertile ones shorter and less erect). Stipes stout, half as long as the lamina, with few scales upwards. Lamina linear-oblong or lanceolate in outline, rather light green, pinnate or bipinnate; pinnae numerous, the lower ones apart, short, triangular; pinnules or segments of pinnae mostly adnate (connected at the base), posterior basal pinnules scarcely longer than the anterior ones, oblong, blunt, more or less pinnatifid or incised and serrate, the serratures tipped by spinulose points; veins of lobes flexuous, depressed or etched on the upper surface. Sori large, with persistent indusia, numerous, principally on the upper half of the frond, forming a row on each side of the midrib of the lobe, and nearer to midrib than margin.

Swamps, swales and boggy ground, in shelter of trees or bushes, not rare. When swamps are cleared of trees, this fern soon disappears. *Ontario*:—Swampy places in woods around Kingston; Belleville; Ramsay; Prescott; Toronto; London; &c. *Quebec*:—Ottawa and Gatineau Rivers; Three Rivers; Lake of Three Mountains; Gaspé; St. Ferreol, &c. *New Brunswick*:—General throughout the province, but not very common. *Nova Scotia*:—Common in shaded, swampy grounds in Halifax County; Queen's; North Mountain; Cape Breton, &c.

4. *L. BOOTHII*, Lawson. *Dr. Booth's Buckler Fern*.—This is supposed to be a hybrid fern, and is intermediate in characters between *L. cristata* and *L. spinulosa*,—differing from the first in its thinner fronds with more acute pinnules, larger teeth, the posterior basal pinnules being larger than the anterior. From the second named species, it differs in producing in spring, early, small, spreading, barren fronds which are pinnate, with decurrent oblong-obtuse pinnules, like those of *L. cristata*; and later, or summer fronds, frequently fertile, which are erect, and larger, with decurrent oblong-obtuse pinnules, as in the earlier barren fronds.

Very rare, and scarce where found. Damp ground near the Sackville River at Bellahill, Halifax County, a small patch, growing with *L. cristata* and *L. spinulosa*, found by the late Mr. Peter Jack.

5. *L. FILIX-MAS*, Presl. *Common Buckler Fern*, of England. *Filix-mas* of the *Materia Medica*. Rhizome short, stout, ascending or erect, the crown of frond-buds

covered with brown scales. Fronds one to three feet in height; stipe rather short, chaffy; lamina rather broadly lanceolate, imperfectly or completely bipinnate; pinnules oblong, obtuse or acutish, serrate, crenate, or incisely lobate, the basal ones more or less distinct, the upper confluent (united or running into each other), marginal serratures not spinulose. Sori numerous, nearer midvein than margin, usually confined to the lower or basal half of the pinnules; indusium firm, roundish, convex at first, with a notch at its depressed funneled point of attachment to the veinlet.

Rare, and local in its distribution. This species was not definitely known to be a native of Canada, until discovered on Owen Sound by the late Mrs. Roy, of Royston Park, in 1866, soon after which it was found in other districts by several botanists. *Ontario*:—Among loose fragments of rock under the limestone cliffs at rear of Royston Park, Owen Sound; also, under the same range of cliffs at a distance of ten miles farther up the Georgian Bay, Lake Huron. *Nova Scotia*:—Whycocomagh, Cape Breton Island, on the Salt Mountain, (Dr. Lindsay); Cape Mabou; Lake Ainslie; and Aspey Bay,—all in Cape Breton, (A. H. Mackay). *Newfoundland*:—Specimen received by the German botanist, Dr. Kunze. *Quebec*: Abundant and very luxuriant along the Gaspé coast at Fox River, (Macoun). *British Columbia*:—Found by Dr. Lyall. This is a common fern in Britain and Western Europe, often growing on banks by the roadsides.

6. *L. MARGINALIS*, Presl. *Marginal-Fruited Buckler Fern*.—Rhizome short, very stout, with numerous scaly stipe-bases, the crown of frond-buds covered copiously with bright brown chaffy scales. Fronds erect, in circular tufts, one to two feet or more in length; stipes from six to twelve inches high profusely covered below with pale thin scales; lamina from nine to eighteen inches, elongate ovate-oblong, of a rather dull green colour, somewhat coriaceous (leathery), pinnate or almost bipinnate; pinnæ linear-lanceolate, broad at base; pinnules oblong, very obtuse, obsoletely incised. Sori terminal on the veinlets, and marginal, appearing prominently in a row round the edges of the pinnules. The frond remains green over winter.

Rocky banks, both in shady and exposed places, the large rhizome enabling this species to resist the heat and drought of summer. It is exclusively confined to the North American continent, and is chiefly found in the countries lying between the Atlantic and the Western Prairies.

Nova Scotia:—Bedford Basin, on Dartmouth side; around Lily and Rocky Lakes, Halifax County; New Ross; North Mountain; Gaspereau Vallay; Caledonia; Cape Breton. *New Brunswick*:—Rather common. *Quebec*:—Cap Tourmente; Gatineau Mills. *Ontario*:—Abundant in dry woods around Kingston; near Odessa; Newboro; Marble Rock and elsewhere on Gananoque River and Lakes; Farmersville; Harwood Creek; Brockville, common; Valley of the Trent, on and around the great boulder; Lakefield, North Douro; Sulphur Spring, Hamilton; Cedar Island; Smith's Falls; Ramsay; Prescott; Belleville; Harrington; London, &c. A very large form, the fronds bipinnate and the pinnules pinnatifid, var. *TRAILLÆ*, was found at North Douro by Mrs. Traill.

7. *L. MONTANA*, Moore. *Mountain Buckler Fern*.—Rhizome short, stout, with strong root fibres, the upper part surrounded by close-set stipe bases. Fronds in close tufts, bright yellowish or golden green, 1 to 3 feet high, with very short thick, scaly stipes, surrounded by close-set stipe bases. Frond lamina lanceolate in outline, much narrowed below,—pinnate, the pinnae being largest in the middle part of the frond, and gradually decreasing to very small size at the base; pinnae linear-lanceolate, deeply pinnatifid; lobes oblong, flat, obtuse, entire, the lowest ones on the pinna parallel with the rachis; sori sub-marginal on the veinlets, and mostly on the upper half of the frond; indusium inconspicuous, imperfect, or absent. Fronds annual, glandular on the lower surface.

British Columbia:—Mount Dawson; Selkirk Range; summit of the C. P. Ry. Pass, (Macoun). Also Island of Unalaska. Not rare in Western Europe.

8. *L. RIGIDA*, Presl. *Stiff Buckler Fern*.—Rhizome short, stout, with close scaly stipe stubs; stipe rigid, erect, half as long as the lamina and very scaly at base; lamina lanceolate, ovate-lanceolate, or somewhat triangular in outline, coriaceous, bipinnate; pinnae oblong-lanceolate, the lowest somewhat triangular; pinnules oblong, veiny, doubly serrate, with spinulose teeth; sori large, nearer mid vein than margin of lobes; indusium with a very narrow sinus and minute glands on the margin.

British Columbia:—Victoria and Mount Finlayson, Vancouver Island. In America confined to Atlantic Coast regions, the prevailing form in California and Oregon being larger in all its parts than the European, and distinguished by the United States botanists as var. *arguta*.

9. *L. FRAGRANS*, Presl. *The Fragrant Buckler Fern*.—Rhizome short and stout, the crown and stipe-bases clothed with glistening golden brown scales. Frond usually only a very few inches in length, (but in exceptionally favourable spots reaching a foot or even more), so that this is the smallest of all the Lastreas. Stipes tufted, very scaly, the shining scales extending along the rachis. Lamina lanceolate coriaceous on the upper surface, bipinnate, pinnae triangular, of few (4 or 5 pairs) of close set pinnules, covered beneath by the large rusty membranous indusia, which conceal the sori.

Nova Scotia:—Hartley waterfall, Pirate Harbour, Strait of Canso, on perpendicular cliffs, very scarce and almost inaccessible, (Rev. E. H. Ball). *New Brunswick*:—Dalhousie; Railway tunnel at Restigouche. *Quebec*:—Saguenay River; Hemmingford; Falls of St. Anne des Monts River, and along the Telegraph Road, Gaspé. *Manitoba*:—Dawson Road. Also at Lake Superior; Nipigon Lake and River; and on the northern and Arctic coasts, as Cape Chudleigh, Cape Prince of Wales, and Repulse Bay. This rare northern species was well described by Sir William Hooker (whose knowledge of ferns was more extensive than that of any other botanist) as one of the most beautiful of all ferns, in the minutely-divided fronds, of a full green colour, destitute of scales above, while the whole of the rest of the plant is richly paleaceous with gold-shining scales. The fresh fronds exhale a delicate fragrance.

10. *L. NOVEBORACENSIS*, Presl. *The New York Buckler Fern*.—Rhizome rather slender, creeping; fronds erect, in compact tufts; stipes very short; lamina twelve or fourteen inches in length, thin and pale green, lanceolate, pinnate, remarkably narrowed below, the pinnæ gradually smaller from above the middle of the frond downwards until they become mere auricles at the base close to the ground; pinnæ sessile linear or linear-lanceolate, acuminate, more or less approximate, deeply pinnatifid; pinnules oblong, usually flat, veins simple (not forked nor otherwise branched); sori small, almost marginal, never confluent.

In moist shady woods, but not in wet places, and never found in marshes or swamps or on the margins of lakes (which are the usual habitats of *L. Thelypteris*, often mistaken for this species).

Nova Scotia.—Woods at Bedford; Lucyfield, Sackville; Beaver Bank, and other places in Halifax County, not rare. *New Brunswick*.—Common. *Prov. Quebec*.—Mount Johnson, Montreal; Belœil; Ottawa; Quebec. *Ontario*.—Prescott; Kingston; Ramsay; Lakefield; North Douro; Seymour; Hamilton; London; Toronto; Windsor; Port Colbourne; Muskoka; Owen Sound; also Maintoulan Islands, &c. *Newfoundland*.—Miquelon.

11. *L. THELYPTERIS*, Presl. *The Marsh Buckler Fern*.—Rhizome slender, creeping, branched, giving off lateral fronds, and scaly at the growing point. Fronds from half a foot (in cold swamps) to two or more in height; stipe as long or longer than the lamina, which, in the sterile frond, is lanceolate, but wide at base, pinnate; pinnæ linear lanceolate, deeply pinnatifid, segments or lobes oblong, obtuse or acute, usually entire, the basal ones often longer. The fertile fronds appear later in summer, have longer and stouter stipes, and the margins or edges of their segments or lobes are turned back (revolute) so that they have a contracted appearance, the pinnæ being consequently narrower and more acute, or acuminate. Sori small, round, forming a line, (and often confluent) on each side of the midvein, midway between it and the margin, but appearing marginal from the involution of the edges of the frond-lobes. Indusium delicate, lacerate, glandular. The fronds wither in autumn.

Marshes, marshy ground, and wet margins of lakes and ponds, not common.

Ontario.—Swamps in the woods at Kingston, and in the township of Hinchinbrook; Portland; Ernestown; Milgrove Marsh, Hamilton; Prescott; Belleville; Ramsay; Thorold; Malden; Muskoka; Parry Sound, &c. Eastern and Central Ontario, general. *Manitoba*.—Red River Settlement, (McTavish). *Quebec Prov.*.—Montreal; St. Joachim; L'Original; Gatineau Mills, on the Ottawa; Temisquata and other places, common. *Nova Scotia*.—North Mountain; Lily Lake, county of Halifax. *New Brunswick*.—Rather common in wet or marshy places.

The most westerly localities known for this fern are Lake Winnipeg and Red River Settlement.

GENUS XIX.—*Polypodium*, LINN. *Polypody*.

1. *P. VULGARE*, Linn. *Common Polypody*.—Rhizome fleshy and cord-like, covered with a fur of brown scales, creeping on soil or on surface of rocks or mossed bark, giving off at intervals leafy fronds borne on smooth straw-coloured stipes (stalks) less than half their own length. Frond more or less fleshy, coriaceous (leathery), in form linear-oblong, or somewhat lanceolate, acuminate (with a prolonged narrow point), deeply cut pinnately into lobes, almost to the mid-rib, or quite so, when the frond becomes pinnate; lobes (or pinnæ) linear-oblong or oblong-lanceolate, obtuse, or often acute, rarely acuminate, the margin usually entire or only slightly toothed, rarely serrate; veins of frond-lobes forked. Sori (fruit-dots) large and round, arranged in a row on each side of the midrib of the lobe or pinna, midway between the midrib and margin. There are two Canadian varieties:—1. *Var. OCCIDENTALE*, with larger fronds, more acuminate towards the tips, the lobes all strongly serrated. 2. *Var. CAMBRICUM*, with broader, paler, or somewhat glaucous fronds, the larger lobes conspicuously wider in the middle, and again divided into lobes or segments, the larger of which are serrulate. Evergreen.

On rocks and boulders in the woods, where the air is kept moist by neighbouring lakes or streams, and on the moss-covered trunks and branches of trees near the sea-shore and by water-falls. *Ontario*:—Not rare around the great lakes and along the course of the St. Lawrence River. *Quebec Province*:—Common around the Gulf shores, and extending eastward to Cape Haldimand, Gaspé. *Nova Scotia*:—Common in Atlantic coast districts, as Halifax and Guysborough. *New Brunswick*:—Common, except in the northern counties. *Manitoba*:—Pentiful in rocky parts. *British Columbia*:—Not rare, but chiefly the variety *occidentale*. *Newfoundland*: Miquelon, (Delamare). This species is also found on the Rocky Mountains, and extends northward to Nelson and Slave River. It is common in northern Asia and Europe, and there extends within the Arctic Circle. *Var. occidentale* was first found on the Island of Sitcha. *Var. Cambricum*.—On rocks at Port Simpson, on Portland Inlet, British Columbia, opposite the southern extremity of Alaska.

2. *P. SCOULERI*, Hook. & Grev. *Scouler's Polypody*.—Rhizome thick, short, fleshy, scaly, creeping, usually on bark; stipes two to four inches long, leafy part of frond six or eight inches long by about three inches wide. Frond fleshy, becoming coriaceous, smooth, oblong-ovate, divided to the rachis into few pinnæ, which are more or less oblong, blunt, or much rounded at the apex, entire. Veins of the lobes anastomosing (netted). Sori very large in size and few in number, ranged near the midrib. Evergreen.

British Columbia:—Alberni, V. I., and on the mainland, rare.

3. *P. FALCATUM*, Kellogg. *Liquorice Fern*.—Rhizome creeping, succulent and sweet to the taste, the younger parts scaly; stipes straw-coloured, half a foot in length, the leafy part of the frond a foot or more long and half as much wide. Frond rather thin

fleshy, slightly coriaceous, smooth, broadly lanceolate, acuminate, deeply pinnatifid or pinnate, the lobes or pinnae broad below, tapering upwards into acuminate points, more or less falcate (sickle-shaped) and sharply serrate. Veins forked or branched. Sori nearer the midrib than margin of the lobe or pinna. Evergreen.

In crevices of rocks and in tree-hollows. *British Columbia*:—Vancouver Island, between Victoria and Esquimaux Harbour. Also Fraser River.

GENUS XX.—*Phegopteris*, FÉE. *Beech and Oak Ferns*.

1. PH. DRYOPTERIS, FÉE. *Common Oak Fern*.—Rhizome branched, slender, creeping, dark coloured, with at first brown scales; stipe slender and weak, longer than the lamina, glabrous, except at the very base. Frond six to twelve inches high, glabrous; lamina thin and delicate, membranous or herbaceous, pale-green, dull, in three, stalked, divaricate, triangular parts or divisions, each of which is pinnate, with its pinnae more or less deeply pinnatifid, the central division largest and symmetrical, the others (side or lateral ones) having their pinnae abbreviated or less developed on the upper side. Var. *ERECTA* is a tall, stout form that grows in wet shady places in rich soil, and resembles the following variety in appearance, but differs from it in the fronds not being covered on the surface with minute glands.

Var. *ROBERTIANA*, Davenport, (Limestone fern of England); rhizome less creeping; frond stout, rigid; stipe and lamina closely beset with minute stalked glands (visible by aid of a lens).

On wooded rocky banks, and in dry woods, very general throughout the whole Dominion, especially in hilly districts. *British Columbia*:—(Found by Dr. G. Dawson). *North-West Territory*:—Echimamish River to Oxford House. *Manitoba*:—Common around Lakes Manitoba and Winnipegosis; and in the Riding, Duck, and Porcupine Mountains. *Ontario*:—Abundant in the woods around Kingston; Ramsay; Prescott; Belleville; Toronto; north shores of Lakes Superior and Huron. *Quebec*: River Rouge; Round Lake; Montreal Mountain; Nicolet River; Somerset; St. Joachim; L'Original, &c.,—common throughout the Province. *New Brunswick*:—So common in the Province that special localities need not be cited. *Nova Scotia*:—Common all over the peninsula of Nova Scotia and also in Cape Breton Island. *Newfoundland*. *Labrador*.

The var. *erecta* grows in beech woods at Collins's Bay, near Kingston; also around the shores of Bedford Basin and the Basin of Minas, *Nova Scotia*. Var. *Robertiana* has been found near Lake Seul, *Ontario*; Lake of the woods, *Manitoba*; Anticosti, *Quebec*.

2. PH. HEXAGONOPTERA, FÉE. *Southern Beech Fern*.—Rhizome long, slender, branching, at first scaly. Frond from one to two feet or more in height; stipe variable in length, but mostly longer than the lamina of the frond. Lamina triangular in outline, acuminate, soft and hairy throughout, pinnate, the lowest pair of pinnae larger than the others, projected forward but not deflexed; pinnae broadly lanceolate, pinnatifid,

the basal lobes decurrent, forming a conspicuous angled wing along either side of the main rachis of the frond. Sori mostly, but not all, near the margin.

Rare. *Quebec Province*:—Waterloo and Sorel; Quebec; Nun's Island, Montreal. *Ontario*:—Chippewa; Parry Sound; Prescott; near Campbellford, and at Port Stanley; St. Thomas and Windsor; London. *Newfoundland*:—Miquelon, plain to south of River Bibite.

3. *PH. CONNECTILIS*, Watt. *Pale Mountain Polypody*.—Rhizome creeping, clothed with pale deciduous scales. Frond a foot high, stipe rather longer than the lamina, which is acutely triangular or deltoid, (longer than broad), acuminate, pinnate, soft, dull green, the veins pilose beneath and the rachis scaly; pinnae linear-lanceolate, pinnatifid, lowest pair deflexed; rachis hairy and minutely scaly to the apex of the frond, as well as the midribs of the pinnae, especially on the lower surface. The round sori near the margin. Fronds wither in autumn.

Ontario:—Ramsay; Prescott; Osgood; Nicolet; Toronto, and westward to Lake Superior, opposite Grand Island. *Quebec*:—Gloucester, near Ottawa; Chelsea; L'Original; Harrington, &c. *Nova Scotia* and *New Brunswick*:—Common in wet spots, on shaded hillsides, and in ravines. *Newfoundland*:—Cape Miquelon. Also in *Manitoba*, in the *Rocky Mountains*, and in *Alaska*.

GENUS XXI.—*Gymnogramme*, DESVAUX.

GYMNOGRAMME TRIANGULARIS, Kaulfuss. *Golden Fern*.—Rhizome small, short, creeping, with chaffy stipe stubs; stipes tufted, wiry, dark, polished; lamina deltoid or pentagonal, a few inches in diameter, the lower pinnae very large, triangular, and twice parted, with the secondary pinnae much elongated on the lower side; upper pinnae lanceolate, and more or less pinnately lobed, covered beneath with yellow powder.

British Columbia:—Crevices of rocks, Vancouver Island, rare.

GENUS XXII.—*Osmunda*, LINN. *Royal Fern*.

1. *O. REGALIS* var. *SPECTABILIS*, Lawson. *American Royal Fern*.—Fronds erect, pale or glaucous green, glabrous, bipinnate; pinnules oblong-lanceolate, oblique, shortly stalked, very slightly dilated at the base, nearly entire; fertile pinnules forming a racemose panicle at the summit of the frond. This Canadian fern is not sufficiently different from the Royal Fern of Europe, *O. regalis*, to take rank as a separate species, but is distinct as a variety. The European *O. regalis* is larger, more robust, (not so tall and thin in proportion), of darker colour, not glaucous, with more widely spreading or divergent pinnae, and more leafy auricled, sessile pinnules, which are more or less pinnatifid at the base, (whereas in the Canadian variety they are quite entire), and

the divisions of the fertile portion of the pinnae are more widely divergent. The slender stiff straight growth and lax branching of our variety distinguish it in gardens.

In swamps and by the margins of rivers, not uncommon in the Maritime Provinces, in Quebec and Ontario, extending westward to the Saskatchewan.

Ontario:—Farmersville; Hardwood Creek; Hinchinbrook, and other places in rear of Kingston, usually in thickety swamps, by corduroy roads, &c. Millgrove Marsh, Hamilton; Ramsay; Belleville; Prescott, common; Welland; Nicolet; Wolfe Island, and Navy Island; Portland; in Bedford township, very abundant; London. *Quebec*:—Near Montreal; Lake St. Charles; L'Original; around Metis Lake; opposite Gros Cap; Sou-sou-wa-ga-mi Creek and Schwibah River. *Newfoundland*:—Bonne Bay, on rocks, 1000 feet above sea level, (a small form). Also *Bermuda*.

2. *O. CLAYTONIANA*, Linn. *Clayton's Royal Fern*.—Rhizome not elongated; frond narrowly lanceolate, pinnate; pinnae lanceolate; fertile fronds like the unfertile, except that about three pairs of pinnae near or below the middle of the frond are contracted and covered with spore cases; sporangia brown, with green spores. When fresh the fronds have an odour resembling that of rhubarb stalks. Fronds wither in autumn.

Bushy places and neglected clearings especially about swampy grounds, not uncommon, from Newfoundland and the Atlantic Islands and coast westward to Manitoba. *Ontario*:—Between Kingston and Kingston Mills, in wet swampy places by the roadside; Little Cataraque Creek; Waterloo; banks of the Humber, near Toronto; Prince's Island, Hamilton; Ramsay; Belleville; Prescott; Brockville; Bedford; near Komoka. Westward to *Manitoba*. *Quebec*:—Lake Settlement, and on the river shore near Gatineau Mills; Dartmouth River, Gaspé; St. Ferrol; Augmentation of Grenville. *New Brunswick* and *Nova Scotia*:—Not uncommon.

3. *O. CINNAMOMEA*, L. *Cinnamon-Stalked Royal Fern*.—Rhizome stout, horizontal, dichotomously branched; sterile and fertile fronds wholly distinct and different, the former ample, broadly lanceolate, pinnate, the pinnae rather deeply pinnatifid, lobes, regular, entire; on the lower surface of each pinnae at its base, there is a small tuft of hairs, which readily distinguishes the barren frond of this species; fertile fronds contracted, erect, in the centre of the tuft of sterile fronds, and not at all foliaceous, decaying early in the summer, sporangia ferruginous or cinnamon-coloured. Fronds wither in autumn.

In bushy places and neglected clearings, common. From Newfoundland, Nova Scotia, New Brunswick, Quebec and Ontario,—as far westward as Georgian Bay and Lake Superior. *Bermuda*. Extends south to Mexico and Guatemala. Found also on the Amur River, Russia.

Ontario:—Kingston, not uncommon; Millgrove Marsh, Hamilton; Sandwich; Belleville, swamps and low grounds, common; Ramsay; Prescott, common; near London; westward to Lake Superior (two Heart River). *Quebec*:—Montreal; opposite Gros Cap; St. Joy Woods, on the river shore, near Gatineau Mills; Nicolet; L'Original. *Newfoundland*.

GENUS XXIII.—*Schizaea*, SMITH. *Split-fruited Fern.*

S. PUSILLA, Pursh. *The Atlantis Fern*.—In small grass-like tufts, infertile fronds an inch or more in length, linear, undivided, twisted; fertile fronds taller (3 or 4 inches), straight, erect, divided at top into a few compact pairs of pinnæ (appearing as if unexpanded), which bear the sporangia.

Nova Scotia:—Found on the shore of Grand Lake, twenty-three miles from Halifax city, N. S., in August, 1879, by Miss Elizabeth G. Knight, of New York. The plants were less than two inches high, the fruit immature; they were growing among the rhizomes of the royal fern. This little fern has not been found since at that place, nor elsewhere in Canada. *Newfoundland*:—St. Pierre, Newfoundland, in peat bog at foot of range of hills to north of Bourg, growing with the swamp orchids, *Arethusa*, *Calopogon*, &c.,—Bernard de la Pylaie, (1816 or 1818-20.) There are specimens from this station in Pylaie's Herbarium in the Paris Museum; but the plant has not been since found in Newfoundland, and only once in Nova Scotia. The only other station known in the whole world for this species is in New Jersey, where it is also very scarce. Plants that are very rare now, and circumscribed in area, are believed to have been more prevalent at some former period.

This unobtrusive fern, so small in size, so inconspicuous in form and colour, belongs to a series which is remarkably distinct in structural characters, and whose comparatively few species are now widely scattered on the islands and around the shores of tropical regions of the earth. It may be regarded as one of the remnants of a probable, long lost, *Atlantis* flora, and is hence called the *Atlantis Fern*.

GENUS XXIV.—*Botrychium*, SWARTZ. *Grape Ferns. Moonwort.*

1. *B. VIRGINIANUM*, Swartz. *The Virginian Grape-Fern or Moonwort*.—Root fibres few, thick, fleshy; stipe fleshy, swollen at base, with a longitudinal sheathing fissure showing the enclosed hairy frond-bud. (In all the other species the bud is entirely concealed by the base of the stipe.) Lamina, infertile, branching from the main axis about its middle, sessile, but its three primary divisions stalked, broadly triangular in outline, much divided, each of the primary divisions being once, twice or three times pinnatifid; the lobes of the pinnules oblong-ovate, deeply incised; texture of the lamina thin, delicate, membranous, veiny. The stipe, rising as a main axis above the lamina, ends in a compound fertile spike of yellow sporangia, being bipinnate or tripinnate. Plant very variable in size, usually a foot or more in height, and one of the most beautiful and distinct of our Canadian ferns; dwarfed specimens, only a few inches in length, are not rare.

In rich woods, or in rocky places where there is accumulation of vegetable soil, general, but nowhere abundant. *Ontario*:—Not uncommon in the woods about Kingston, and the surrounding country, as near Odessa; Wolfe Island; also Hinchinbrook, &c.;

Delta; Toronto; at the Sulphur Spring, Hamilton; Prescott; Chippawa; Belleville; Ramsay; London; north shore of Lake Superior; at Red Rock; Nipigon; Thunder Bay; and up the Kaministiquia. *Quebec*:—Rivière Rouge; Montreal; Gaspé; Stanfold; Grenville; Island of Anticosti in the Gulf of St. Lawrence. *North-West Territory, &c.*:—Hill Portage, above Oxford House; Saskatchewan; Rocky Mountains; lower slopes of South Kootanie Pass, lat. 49°. *British Columbia*:—Fort McLeod, lat. 55°; and lower valley of Fraser River. *Nova Scotia*:—Blomidon; Scott's Bay; Five Islands; Pictou; Port Mulgrave, Strait of Canso; Truemanville, Cumberland County. *New Brunswick*:—Rather common in this Province. *Newfoundland*.

2. *B. TERNATUM*, Swartz. *Leathery Moonwort*.—Root of elongated, thick, fleshy, tuber-like fibres. Stipe 3 or 4 to 10 or 12 inches in height. Lamina thick and leathery in texture, long-stalked, arising from near the base of the stipe or main axis, triangular or broadly deltoid in outline, ternately divided, the divisions stalked and twice or thrice pinnate, the ultimate lobes being more or less triangular, lanceolate or ovate, nearly entire or incised. The sporangia-bearing spike is long-stalked, and twice or thrice pinnate.

In old pastures, dry grassy places by river sides, &c., not decidedly rare, but not common.

Nova Scotia:—Cape Porcupine; Boylston, Guysborough County; Rawdon and Windsor, Hants County; Sackville; Bedford; New Germany and Oaklands Lake, Mahone Bay. *Quebec*:—Three Rivers; St. Joachim; L'Original; Quebec; Richmond and Drummond Counties. *New Brunswick*:—Rapide de Femine, below Grand Falls; not rare in this Province. *Ontario*:—Gananoque Lake; Castleton and Belleville; Prescott Junction westward; English's Woods, London; Hamilton; Leamington; Blenheim; near Ottawa; north shore of Lake Superior; Rice Lake Plains. *British Columbia*:—New Westminster. *Manitoba*:—Frequent on the western prairies, extending to Rocky Mountains,

3. *B. LUNARIA*, Swartz. *Common Moonwort*, of Europe.—Frond from 4 to 8 inches in height, thick and leathery; infertile lamina sessile, arising from the middle part of the stipe or main axis, oblong or somewhat ovate, only once pinnate (the pinnæ not pinnatifid); pinnæ cuneate at base, rounded-lunate, the outer or convex margin slightly notched or incised not lobed.

Rather rare. *Quebec*:—North side of Orleans Island; Rivière du Loup; near Cape Rosier, Gaspé. *Ontario*:—North shore of Lake Superior, and the Pic and Nipigon Bay; Nipigon River and Lake Nipigon. *Manitoba*:—On prairie close to sand hills at Flat Creek. *North-West Territory*:—Carleton House on the Saskatchewan, and Bow River Pass, Rocky Mountains; Echmamish River to Knee Lake, and Churchill River, near Hudson Bay. *British Columbia*:—Near Fort McLeod, lat. 55°.

4. *B. MATRICARIÆFOLIUM*, Braun. *Chamomile-leaved Grape-Fern*.—Frond rather fleshy, from a few inches to, rarely, a foot in height. Infertile lamina stalked, arising far

above the middle of the main axis, oblong-ovate, pinnate; pinnae more or less pinnatifid, their lobes oblong-ovate, obtuse; the shortly stalked fertile spike bipinnate.

New Brunswick:—Petitcodiac and Titusville. *Quebec*:—Cape Rosier, Gaspé; King's Mountain, Chelsea. *Ontario*:—Lake Superior; Belleville; five miles north of Campbellford, Northumberland County; Nipigon River and Islands on Lake Nipigon. *Nova Scotia*:—Pictou; Truemanville; Blomidon.

5. *B. LANCEOLATUM*, Angström. *Lance-leaved Grape-Fern*.—Frond from 2 to 6 or 8 inches high, rather thin; infertile lamina not stalked, arising from the main axis far above its middle, pinnate, pinnae pinnatifid (in well-developed individuals), lobes oblong lanceolate, acute, (the form of the ultimate lobes distinguishes this species from *B. matricariaefolium*); fertile spike short stalked, twice or thrice pinnate.

Nova Scotia:—Truemanville. *New Brunswick*:—Fredericton and Bass River. *Quebec*:—Magog.

6. *B. SIMPLEX*, Hitchcock. *The Simple-Fronded Grape-Fern*.—A few inches (1-6) high, fleshy and glabrous; infertile lamina stalked, usually arising from near the rhizome or below the middle of the main axis, small, more or less ovate, lobed or incised, the lobes obovate-cuneate; fertile spike once or twice pinnate.

Nova Scotia:—Windsor; Truemanville, Co. Cumberland. *New Brunswick*:—Petitcodiac; Fredericton; Dalhousie. *Quebec*:—Temisquata; Quebec; Montreal; Grenville, Argenteuil Co. *Ontario*:—Georgian Bay; meadows along the Kaministiquia River, above Fort William, Lake Superior. *North-West Territory*:—Between Cumberland House and Hudson Bay.

GENUS XXV.—*Ophioglossum*, LINN. *Adder's Tongue*.

O. VULGATUM, Linn. *Adder's Tongue*.—Rhizome fleshy, with a descending axis, spreading fleshy roots, and a sheathed terminal bud or growing point. Frond a few inches in height; stipe erect, succulent, hollow, bearing a sessile leaf-like frond, subtending the erect fertile peduncle which bears the fleshy spore cases imbedded in a series or row on each margin of the spike; they ultimately split horizontally and give it a toothed appearance. Sometimes the fruit-spike is forked, and it is so figured in very old books. This probably originated the name *Ophioglossum*, or *Adder's Tongue*.

Grassy places, rare, and inconspicuous. *Nova Scotia*:—Truro, Dr. G. C. Campbell; Truemanville, A. J. Trueman. *New Brunswick*:—Hopewell and Cape Enrage. *Quebec*:—Melbourne; Hemmingford; and Hemlock Lake, Ottawa. *Ontario*:—Port Stanley; Belleville; Tudor; McCann's Island; St. Thomas; Toronto; Lake of the Woods.